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10/737,374	12/16/2003	Roger Hansen	200312027-1	5369

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EXAMINER	
TRUONG, LOAN	

ART UNIT	PAPER NUMBER
2114	

NOTIFICATION DATE	DELIVERY MODE
12/30/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/737,374	HANSEN ET AL.	
	Examiner	Art Unit	
	LOAN TRUONG	2114	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 38-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 38-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response applicant's argument filled November 30, 2009 in application 10/737,374.

2. Claims 1-9 and 38-41 are presented for examination. Claims 10-37 are cancelled. Claims 40-41 are newly added.

Response to Arguments

3. Applicant's arguments with respect to claims 1-9 and 38-41 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-9 and 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeKoning (US 6,691,245) in further view of Boyd et al. (US 6,721,806).

In regard to claim 1, DeKoning teaches a system for storing checkpoint data comprising:

a network interface to an external network (*local host is typically connected to the client devices by system such as LAN, WAN or dedicated communication channel, col. 5 lines 25-30)*; and

a persistent memory unit coupled to the network interface (*local storage device connects through a conventional signal communication path such as LANs or SANs, col. 6 lines 25-33)*, wherein:

the persistent memory unit (*local storage, fig. 1, 108)* is configured to receive the checkpoint data into a region of the persistent memory unit from a primary process through the network interface (*checkpoint procedure is initiated by the local host device in which data is sent to the local storage device, col. 8 lines 48-53)*, and to provide access to the checkpoint data in the region from a backup process through the network interface (*local volume in the local storage device is mirrored to the remote storage device, col. 7 lines 5-10)*; and

the backup process provides recovery capability in the event of a failure of the primary process (*in a fail-over situation the client devices must switch to using remote storage device with a remote host device for data backup processing, col. 2 lines 14-19).*

DeKoning does not explicitly teach a persistent memory unit configured to receive data via a remote direct memory write command and request data via a remote direct memory read command wherein the remote direct memory write command is

preceded by a create request for the region and the read command is preceded by an open request for the region.

Boyd et al. teach of a remote direct memory access enabled network interface controller switchover and switchback support by implementing a RDMA read work request reads a virtually contiguous memory space on a remote endnode (*col. 8 lines 59-67)* and where the virtually contiguous memory addresses that have been bound to a previously registered region (*col. 8 lines 49-58).* Also a RDMA write work queue element provides a memory semantic operation to write a virtually contiguous memory space on a remote node (*col. 9 lines 1-3)* where a bind remote access key work queue element provides a command to modify a memory window by associating the memory window to a memory region and the R-Key is part of each RDMA access and is used to validate that the remote process has permitted access to the buffer (*col. 9 lines 20-26).*

It would have been obvious to modify the system of DeKoning by adding Boyd et al. remote direct memory access enabled network interface. A person of ordinary skill in the art at the time of applicant's invention would have been motivated to make the modification because it would provides a method where a RDMA enabled NIC can support a redundant configuration consisting of a primary and an alternate RDMA enabled NIC (*col. 1 lines 9-15).*

In regard to claim 2, DeKoning teaches the system of Claim 1, further comprising:

a persistent memory manager configured to provide address context information to the network interface (*local storage device service the storage, database or other access requests of the various client devices, col. 5 lines 23-26).*

In regard to claim 3, DeKoning teaches the system of Claim 1, wherein the persistent memory unit is configured to provide memory read access to the checkpoint data to another processor, and the backup process is executed by the other processor (*local and remote host, fig. 1).*

DeKoning does not explicitly teach the system wherein the memory unit is configured to provide a remote direct memory read.

Boyd et al. teach of a remote direct memory access enabled network interface controller switchover and switchback support by implementing a RDMA read work request reads a virtually contiguous memory space on a remote endnode (*col. 8 lines 59-67)* and where the virtually contiguous memory addresses that have been bound to a previously registered region (*col. 8 lines 49-58).*

Refer to claim 1 for motivational statement.

In regard to claim 4, DeKoning teaches the system of Claim 1, wherein the persistent memory unit provides the checkpoint data through memory reads by the backup process after the primary process fails (*in a fail-over situation the client devices must switch to using remote storage device with a remote host device for data backup processing, col. 2 lines 14-19).*

DeKoning does not explicitly teach the system wherein the memory unit is configured to provide a remote direct memory read.

Boyd et al. teach of a remote direct memory access enabled network interface controller switchover and switchback support by implementing a RDMA read work request reads a virtually contiguous memory space on a remote endnode (*col. 8 lines 59-67)* and where the virtually contiguous memory addresses that have been bound to a previously registered region (*col. 8 lines 49-58).*

Refer to claim 1 for motivational statement.

In regard to claim 5, DeKoning teaches the system of Claim 1, wherein the persistent memory unit is configured to store multiple sets of checkpoint data through memory writes sent from the processor at successive time intervals (*multiple checkpoints are maintained with markers set in the snapshot indicating each of the checkpoints, col. 7 lines 40-50).*

DeKoning does not explicitly teach the system wherein the memory unit is configured to store through a remote direct memory writes.

Boyd et al. teach of a remote direct memory access enabled network interface controller switchover and switchback support by implementing a RDMA write work queue element provides a memory semantic operation to write a virtually contiguous memory space on a remote node (*col. 9 lines 1-3)* where a bind remote access key work queue element provides a command to modify a memory window by associating the memory window to a memory region and the R-Key is part of each RDMA access and is

used to validate that the remote process has permitted access to the buffer (*col. 9 lines 20-26).*

Refer to claim 1 for motivational statement.

In regard to claim 6, DeKoning teaches the system of Claim 5, wherein the persistent memory unit provides the multiple sets of checkpoint data through memory reads upon request by the backup process at one time (*in the event of a failure using checkpoints and the snapshots can quickly restored to a coherent state, col. 7 lines 40-57).*

DeKoning does not explicitly teach the system wherein the memory unit is configured to provide a remote direct memory read.

Boyd et al. teach of a remote direct memory access enabled network interface controller switchover and switchback support by implementing a RDMA read work request reads a virtually contiguous memory space on a remote endnode (*col. 8 lines 59-67)* and where the virtually contiguous memory addresses that have been bound to a previously registered region (*col. 8 lines 49-58).*

Refer to claim 1 for motivational statement.

In regard to claim 7, DeKoning teaches the system of Claim 1, wherein the primary process provides the checkpoint data to the persistent memory unit independently from the backup process (*checkpoint procedure is initiated by the local host device in which data is sent to the local storage device and local storage device then forwards the checkpoint information to*

the remote storage device, col. 8 lines 48-63).

In regard to claim 8, DeKoning does not explicitly teach the system of Claim 1, wherein the persistent memory unit is configured as part of a remote direct memory access-enabled system area network.

Boyd et al. teach of a remote direct memory access enabled network interface controller switchover and switchback support by implementing a RDMA read work request reads a virtually contiguous memory space on a remote endnode (*col. 8 lines 59-67)* and where the virtually contiguous memory addresses that have been bound to a previously registered region (*col. 8 lines 49-58).* Also a RDMA write work queue element provides a memory semantic operation to write a virtually contiguous memory space on a remote node (*col. 9 lines 1-3)* where a bind remote access key work queue element provides a command to modify a memory window by associating the memory window to a memory region and the R-Key is part of each RDMA access and is used to validate that the remote process has permitted access to the buffer (*col. 9 lines 20-26).*

Refer to claim 1 for motivational statement.

In regard to claim 9, DeKoning teaches the system of Claim 1, wherein the persistent memory unit is configured with address protection and translation tables to authenticate requests from remote processors, and to provide access information to authenticated remote processors (*remote storage device is initially fully mirrored from the local storage device before operations*

can start using the local host device, col. 7 lines 58-65)..

In regard to claim 38, DeKoning teaches the system of Claim 1, wherein the persistent memory unit is further configured to store meta-data regarding the contents and layout of memory regions within the persistent memory unit and to keep the meta-data consistent with the checkpoint data stored on the persistent memory unit (*primary storage device stores data received from the host device responds to the storage access request and at a synchronization checkpoints forward the data and the synchronization checkpoint to the secondary storage, col. 4 lines 1-8).*

In regard to claim 39, DeKoning teaches the system of Claim 1, wherein the persistent memory unit is further configured to provide access to the checkpoint data in another region via a memory read command from the backup process through the network interface (*local storage device updates and synchronizes or flushes the data to the remote storage device, col. 10 lines 15-20).*

DeKoning does not explicitly teach the system wherein the memory unit is configured to provide a remote direct memory read wherein the read command is preceded by an open request for the another region.

Boyd et al. teach of a remote direct memory access enabled network interface controller switchover and switchback support by implementing a RDMA read work request reads a virtually contiguous memory space on a remote endnode (*col. 8 lines 59-*

67) and where the virtually contiguous memory addresses that have been bound to a previously registered region (*col. 8 lines 49-58).*

Refer to claim 1 for motivational statement.

In regard to claim 40, DeKoning teaches the method of Claim 1, wherein the checkpoint data received by the persistent memory unit overwrites a current set of the checkpoint data (*new data adds, deletes or modifies data that is stored in local volume, col. 8 lines 18-31).*

In regard to claim 41, DeKoning teaches the method of Claim 1, wherein the checkpoint data received by the persistent memory unit is appended to a previous set of the checkpoint data (*preexisting replaced data is transferred to the snapshot repository, col. 8 lines 3-12).*

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Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO 892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Loan Truong whose telephone number is (571) 272-2572. The examiner can normally be reached on M-F from 10am-6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Scott Baderman can be reached on (571) 272-3644. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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